On the Independence of the analytical and geometrical Methods of Investigation; and on the Advantages to be derived from their Separation. *By* Robert Woodhouse, *A.M. Fellow of Caius College, Cambridge.* *Communicated by* Joseph Planta, *Esq. Sec. R.S.* Read January 14, 1802. [*Phil. Trans.* 1802, *p.* 85.]

The author, in the prefatory part of this paper, points out the difference between the two methods of solving problems,—the one using lines and diagrams as the signs of quantity, and making an individual to represent a genus; and the other employing generic terms and signs, which bear no resemblance to the things signified: and insists that, in order to make the process of deduction distinct, exact, and luminous, only one of the two methods ought to be adhered to. This, he says, has not been sufficiently attended to, expressions and formulas of the two methods having often been blended together, the consequence of which has been much ambiguity and paradox; since the true method of combining algebraical formulas cannot be well understood, unless we duly attend to their true analytical source and combination. To show that the language of algebra need not be infected with the mode of expression adopted by geometricians, and that it is of itself an adequate instrument of argumentation, is the principal object of Mr. Woodhouse's paper. And he declares that he has entered on this inquiry, not merely for the sake of gratifying speculative curiosity, being firmly of opinion that the process of calculation will be much more direct, sure, and expeditious, if it be duly freed from all foreign encumbrances.

In order to illustrate and confirm this opinion, he has selected a few cases from those expressions and formulas which are supposed to require for their solution the aid of geometrical theorems, and of the properties of curves.

From purely analytical principles he has given demonstrations; 1st, of the integrals of a series for the sine of an arc in terms of the arc; 2ndly, of the expression for the root of a cubic equation in the irreducible case; 3rdly, of the resolution of the series $x^n \mp a^n$, &c., into quadratic factors; and, 4thly, of the series for the chord, sine, cosine, &c. of a multiple arc, in terms of the chord, sine, &c. of the simple arc. These demonstrations the author presumes to be direct and rigorous, which advantages, he asserts, are in a great measure owing to the deductions being expressed in algebraical language, and effected throughout by analytical processes.

The paper concludes with a brief comparison of the ancient geometry and modern analysis respecting the advantages of perspicuity and commodious calculation. The result of this comparison is, that some of the excellencies of the former science have been exaggerated, and others deemed essential, which in fact are only accidental. If the object of mathematical study be chiefly recreation, and the exercise of our mental faculties, our author admits that the finest examples of reasoning are to be found in the works of the ancient

geometricians; but he further insists that, for the investigation of abstruse and latent truth, and the evolution of intricate problems, the analytical method is on every consideration to be preferred to the geometrical.

Observations and Experiments upon oxygenized and hyperoxygenized Muriatic Acid; and upon some Combinations of the Muriatic Acid in its three States. *By* Richard Chenevix, *Esq. F.R.S. and M.R.I.A.* Read January 28, 1802. [*Phil. Trans.* 1802, *p.* 126.]

The author introduces the subject of his paper by stating that Mr. Berthollet, having observed a large portion of common muriate of potash to be always produced along with the hyperoxygenized muriate, had formed an ingenious conjecture, that the quantity of oxygen, relatively to the acid, was greater in the salt than in disengaged oxygenized muriatic acid; but that no experiments having appeared since the year 1788 to prove this assertion, he was induced to examine the properties of the salt, and the nature of the acid it contains. He next mentions such authors as have treated any part of his subject; and intimates that Mr. Hoyle of Manchester appears to him to be the chemist, who, after Mr. Berthollet, has approached nearest to the truth. He then proceeds to describe the means by which he has determined that the acid contained in his hyperoxygenized muriate of potash is, in fact, an acid *sui generis*; and those by which he arrived at the proportion of oxygen. After which he treats of the saline combinations of oxygenized and hyperoxygenized muriatic acids.

To determine the proportion of oxygen in hyperoxygenized muriatic acid, he distilled one hundred grains of hyperoxygenized muriate of potash in a coated glass retort, and collected one hundred and twelve cubic inches of oxygen gas, = 38·3 grains. He then precipitated by nitrate of silver the salt which remained in the retort, and a small portion of it that had been volatilized into the tube, and obtained a quantity of muriate of silver, corresponding with twenty of muriatic acid; and hence he concluded that one hundred parts of hyperoxygenized muriatic acid contained,

Oxygen	65
Muriatic acid	35
	100

He then passed a current of oxygenized muriatic acid through a solution of potash, and distilled the liquor to dryness in an apparatus, by which he could ascertain whether there was any disengagement or absorption of oxygen from the liquor or from the salt it held in solution. No oxygen was disengaged or absorbed; and hence it appears that the same quantity was now condensed in the hyperoxygenized muriate of potash as was originally contained in a relative quantity of oxygenized muriatic acid. The salt thus obtained, Mr. Chenevix, for the sake of brevity, calls *entire salt*. He analysed it,